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October 23, 1995

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USEPA Region X
1200 Sixth Avenue HW-113
Seattle, WA 98101

ATTENTION: Mr. T. Brincefield, Superfund Site Manager Manager

RE: RESPONSE TO EPA COMMENTS ON SODA CREEK SEDIMENT REPORT

Dear Mr. Brincefield:

Attached to this letter are Monsanto's comments on the report "Evaluation of Sediment Chemistry, Toxicity and Bentic Invertebrate Community Structure in Soda Creek and Alexander Reservoir" prepared by Golder Associates Inc. If you have any questions, please contact Bob Geddes at (208) 547-3391 or myself.

Sincerely,

GOLDER ASSOCIATES INC.

David Banton
Principal

cc: C. Hunter, GAI
R. Geddes, Monsanto
D. Wilson, Monsanto
W. Wright, Montgomery Watson
D. Pahl, Montgomery Watson

Attachments: Response to Comments

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Comments on the
Evaluation of Sediment Chemistry, Toxicity, and
Benthic Invertebrate Community Structure
in Soda Creek-and Alexander Reservoir

These general comments and questions focus on whether the work plan was followed, work was documented adequately, the objectives of the study were met, and whether the presented results are justified.

General Comments:

1. *The Sampling and Analysis Plan (SAP) for the Collection and Analysis of Sediment and Water Samples From Soda Creek and Alexander Reservoir* was reviewed to determine whether sediment and water sample collection were completed as planned. The field sampling methods reported in the SAP were closely adhered to during the field effort. However, the jars noted in the SAP were plastic (HDPE), but were listed as glass in the sediment evaluation report. Plastic jars are more appropriate for metals analysis, but, if the glass jars were acid washed, the effect on metals analysis should be negligible. The sediment evaluation did not report whether the glass sample jars were acid washed. This should be verified. If no acid wash was completed on the sample jars for metals analysis, the inaccurate analytical results exists. This potential should be discussed in the sediment evaluation, if necessary.

Response: Sample jars were pre-acid washed by the supplier. No effect on sediment evaluation is expected. The use of glass jars will be documented in the report.

2. The completed field work is adequately documented in the sediment evaluation. However, no reference is made in the sediment evaluation as to 1) whether the data quality objectives were met, nor to 2) a data quality review/validation report which was to be completed by the laboratory. Was this review/validation completed? If so, the results need to be briefly discussed in the sediment evaluation or included as an appendix.

Response: The review/validation was completed and will be included in the final report as an appendix.

3. The specific sampling objectives of the SAP were met. However, the SAP identifies trout as the primary assessment endpoint. No mention of the potential effects on trout are discussed in the sediment evaluation. The data collected is adequate to fulfill the objectives; however, the objectives

of the sediment evaluation have not all been met due to a lack of clarity in the sediment evaluation report.

Response: The SAP stated that trout were identified by the ecological risk assessment as an assessment endpoint. The SAP chose benthic organisms and sediment chemistry as measurement endpoints. The report of results from Soda Creek Sediment Sampling is not a risk assessment, but rather, a data report that can be used in risk assessment.

4. Some results are presented in the methods section and some conclusions are presented in the results section. This made the document hard to follow at times because the final conclusions are based upon information in different areas of the document.

Response: Text will be clarified.

5. The document is sometimes concise to the point that it does not clearly support the conclusions. Important descriptions of methods and evidence appear to have been omitted. For example, the benthic community statistical analysis for Soda Creek was not conducted in accordance with the "Statistical Analysis Plan For Sediments Collected From Soda Creek and Alexander Reservoir" (Document to T. Brincefield from Golder Associates, dated February 27, 1995. Golder reference 913-1101.603). Instead Canonical Correlation Analysis (CCA) was used. The CCA methods were not presented clearly. Therefore, the results of the Soda Creek benthic invertebrate analysis do not appear to be clearly supported.

Response: The statistical analysis of the benthic community for Soda Creek and Alexander Reservoir was done using the statistical techniques discussed in the Statistical Analysis Plan, a MANOVA/ANOVA approach. The Canonical Correlation Analysis (CCA), which was not discussed in the Statistical Analysis Plan was done in addition to the originally planned analyses. The CCA is used to tie together the sediment chemistry and benthic community. We believe that the analysis does support the conclusions.

Specific Comments:

These comments are divided into high, medium, and low priority. High priority comments must be addressed in your response to EPA, in some cases to provide clarification and in others to support and/or change critical conclusions of the report. Medium priority comments represent aspects which could add to reasoning and justification and would lead to clarification of the report. Low priority comments represent simple corrections that would help polish the document but would not

change or justify any important aspects. Written responses are not required for medium or low priority comments.

High Priority:

1. Page 3, Section 2.1, Second Paragraph, Fourth Sentence: The text indicates Soda Creek is redirected all year. Are there high water periods or diversion canal closures when the creek flows over the dam? If so, at what level (CFS) does this occur and how many days per year during an average precipitation year?

Response: There are no records to answer this question. Flows are not monitored at the diversion dam. Because the flows are used for power generation, flow is diverted year-round. It is possible for the creek to flow over the dam, but it is not a planned event.

2. Page 3, Section 2.1, Second Paragraph: While the paragraph goes into some detail regarding the diversions and uses of Soda Creek it does not support later conclusions that the entire creek is diverted at the first dam. In winter, there is no irrigation, so does the power house use all the flow, or does the water back up in the diversion canal and begin running over the dam into the Soda Creek channel? This becomes important later in the document when the claim is made (Page 24, Section 6.1, Second Paragraph, Third Sentence) that there is no route for Cooling Water related contaminants to the portion of the creek between the first dam and the powerhouse outlet. Since one of the most contaminated areas is within 5,000 feet downstream of the diversion dam, the statement must be justified and documented.

Response: The powerhouse uses all of the flow from Soda Creek in the non-irrigation months. As noted by the reviewer, the text provides considerable details on the creek and its use. We believe it is sufficiently documented.

3. Page 5, Section 3, Second Paragraph: According to Table 3-1, aluminum and vanadium were detected in one sample of Cooling Water. Also, what was the reasoning for not analyzing molybdenum? Was it not expected? Molybdenum is discussed later in the document.

Response: The list of constituents was based on previous Phase I and II RI sampling. It was agreed to by EPA in approving the SAP.

4. Page 9, Section 4.4, First Paragraph: How was 33 mg/l sodium bicarbonate determined to approximate the conductivity, alkalinity, and sodium content of the site surface waters? Were actual measures taken of these parameters for the dilution water? If so they should be provided.

Response: The toxicity laboratory measured pore water from Soda Creek sediment samples. Results will be supplied in an appendix.

5. Page 11, Section 4.5.2, Third Paragraph: There is no explanation of the methods used for analysis of the "erosional station" benthic data. The reservoir benthic data is considered in the MANOVA, but no further steps are provided. Please explain briefly.

The explanation of Canonical Correlation Analysis (CCA) is not clear. What are the assumptions of CCA? Clarification is needed.

Response: Section 4.5.2 will be expanded to discuss the erosional station benthic data. The use of CCA after the MANOVA analyses will be clarified. Additionally, the explanation of CCA will be improved.

6. Page 11, Section 4.5.2, Fourth Paragraph: How are the sets of canonical covariates (coefficients?) estimated to produce the maximum canonical correlation, then the second highest correlation etc. Also, which is the one corresponding canonical covariate?

Response: The clarification of CCA, discussed in comment 5, will include clarification of the "corresponding canonical covariate".

7. Page 20, Section 5.2.1.2: Interpretation of these results is difficult given the incomplete description of CCA in earlier sections of the report.

In the second paragraph of the section, the canonical correlation is provided for the two sets of canonical covariates. Describe the significance of a squared canonical correlation of 0.84 or 0.66? Generally, present how the correlations calculated and what they mean?

Response: The clarification of CCA, discussed in comments 5 and 6, will clarify the meaning of the canonical correlation. References will be provided to the appropriate statistical literature that contain the formulae used in the calculations.

8. Page 22, Section 5.2.1.2, First Partial Paragraph on Page: The conclusions stated are not clearly supported.

Response: The expanded discussion of the statistical procedures and data interpretation will be used to further support the overall conclusions of the study.

9. Page 22, Section 5.3, Second Paragraph: Were these results from the t-tests conducted by the lab (Section 4.4, Page 9) or was nested ANOVA used (Section 4.5.3, Page 12)? If it was a t-test were treatments compared

to reference and laboratory controls? Laboratory data sheets (test conditions and monitoring forms, and any statistics performed) for the toxicity tests should be included in an appendix of the report.

Response: Nested ANOVA was used in this study. Test will be corrected.

10. Page 23, Section 5.3, Last Sentence on Page: This conclusion is not supported by the evidence provided. The controls had a much higher mortality rate (and STDEV) than reference samples. This suggests the potential for some problems with chironomid survival in the laboratory controls. Do the lab reports suggest food was not adequate, or was different between groups? The fact that the treatment group's dry weights are less than the reference groups suggests something other than food was the cause of the significant differences. The steady decrease in dry weight and the increase in mortality from group 1 to group 3 correlates well with chemical concentration gradients in the same groups.

Response: The laboratory does not provide any indication of problems regarding food adequacy. It may be that the reference samples, being natural sediments, had additional food sources relative to the control sediments. Regarding correlations between groups and chemical concentrations in Soda Creek sediments, the high variability within and between groups would make any correlation insignificant. Results of the MANOVA can be reviewed to confirm this.

11. Page 24, Section 6.1, Second Paragraph, Second Sentence: This statement is entirely dependent upon the fact that water does not flow over the diversion dam.

Response: Comment noted, see High Priority Comment #1.

12. Page 25, Section 6.1, Second Full Paragraph on Page: Conclusions are dependent upon the CCA which needs further clarification, as noted in this memo.

Response: Clarification will be provided as part of response to earlier comments.

13. Page 25, Section 6.1, Third Full Paragraph on Page. Conclusions are dependent upon the response to comment 9.

Response: Comment noted.

14. Page 26, Section 6.2, first, Second, and Third Full Paragraphs on Page: Conclusions are dependent upon the results of changes in this memo.

Response: Comment noted.

Medium Priority:

1. Page 4, Section 2.1, Fourth Paragraph of Page: Have any unique or "soda dependent" species been documented in Soda Creek. Does the creek provide unique habitat? This information is important to risk managers and in risk management decisions.

2. Page 5, Section 3, Third Paragraph: Are the values presented in Table 3-1 presented as total or dissolved concentrations?

3. Page 9, Section 4.4, First Paragraph: Provide a brief rationale for using *Chironomous tentans* as the species.

4. Page 10, Section 4.5: This section describes methods, but incorporates results. See general comment 2.

5. Page 10, Section 4.5, Second Full Paragraph on Page: A qualitative discussion of molybdenum concentrations should be presented in the results section. This paragraph eliminates molybdenum from consideration and it is never addressed or assessed again. Why might it have been found at stations SC-2 and SC-3? Are the concentrations detected high?

   Page 10, Section 4 5, Third Full Paragraph on Page: For statistical purposes it is appropriate to remove "rare" species However, a review of the excluded rare taxa and the "quality" of sediments they generally inhabit would be useful in assessing whether it is appropriate to disregard them completely. Also, The explanation for "reducing taxa to those that collectively constituted >95% of total invertebrates" is difficult to understand. Does this mean that if a taxa had less than 5% of the total number of invertebrates, across stations, it was not considered? Please clarify Table 5-9 has shaded areas which indicate the **mean** number of invertebrates at a station is 5% or greater of the total number of invertebrates Is this the same as explained on Page 10?

6. Page 11, Section 4.5.2: See comment 5 above. Provide a list of the "rare" species not considered and qualitative review of where they were found or not found. Provide potential reasons why they may or may not have been found in certain areas.

7. Page 12, Section 4 5 3, First Paragraph: List which results from which stations were eliminated from the statistical analysis (see comment 8).

8. Page 13, Section 5.1, Second Paragraph: Table 5-2 or another table should provide the raw data from each of the three samples at each station from Soda Creek. This table could also answer comment 7.

9. Page 13, Section 5.1, Second Paragraph, Third Sentence: Sentence is unclear. Does it refer to all samples, or just samples in Soda Creek? Also, does it maximum concentrations? Also, does it refer to mean or maximum concentrations?

10. Page 13, Section 5 1, Third Paragraph, Sixth Sentence: This sentence should state whether the regression calculation was based upon means or maximums.

11. Page 13, Section 5 1, Third Paragraph, Last Sentence and Tables 5-1 through 5-6: Did the calculated UTLs for each analyte ever exceed the maximum reference concentration? If so, the maximum detected concentration for the analyte should be substituted in place of the UTL. Also,
Why was a table/graph similar to Tables 5-1 through 5-6 not provided for Silver?

12. Page 14, Section 5 1, First Incomplete Paragraph on Page: A sentence should be added stating that arsenic and nickel were detected at low concentrations in Mormon Springs. Also in the sentence which runs between Page 13 and 14 in this paragraph, it should be stated that copper was only tested in two of the seven samples collected from Mormon Springs.

13. Page 14, Section 5 1, First Full Paragraph on Pace: Same as comment 11.

14. Page 14, Section 5.1, Second Full Paragraph on Page, Fourth Sentence: Figures similar to 5-1 through 5-13 would be helpful to interpret the deeper "longitudinal sediment profile." Interpretations of these data are questionable only two depths are available for all of the creek stations and three depths are available for only one of the reservoir stations. No distinct conclusion should be made based upon the data.

15. Page 14, Section 5.1, Second Full Paragraph on Page, Last Sentence: This conclusion cannot be made because no trends can be predicted for any of the other stations (see comment 14). Remove "only" from or eliminate the sentence and explain that no conclusions can be drawn due to the limited number of depth profile samples at each station.

16. Page 14, Section 5.1, Third Full Paragraph on Page: Magnesium, pH, Temperature, and O_2 are not highest at SC-2.

17. Page 21, Section 5.2.1.2, First Full Paragraph on Page: The paragraph does not complete the reasoning behind the opening two sentences. It suggests a weakness of multiple regression, but does not support or explain why CCA is superior.

18. Page 21, Section 5.2.1.2, Second Full Paragraph on Page: The benthic communities do not appear to be "radically" different. The core taxa are very similar for each station, but the numbers of each are different.

19. Page 22, Section 5.3: Were only the living chironomids dried and weighed for inclusion in the statistical analysis?

20. Page 24, Section 6.1, First and Second Paragraphs, Last Sentence of each: Are there other documented outfalls on Soda Creek that may contribute silver or other contaminants to the creek?

21. Page 27, Section 7, Second Bullet: Were treatments ever just compared to reference as stated in this bullet? Section 4.4 on Page 9 states that treatments were compared to laboratory controls using t-tests. Section 4.5.3, Page 12 states that a nested ANOVA was used. Which is correct?

22. Page 27, Section 7: The conclusions presented are dependent upon responses to these comments.

23. The use of effects benchmarks such as the Ontario Sediment Guidelines, in addition to the included material, would help support a weight of evidence approach to determining the potential for effects in sediments. Graphical depiction of the benthic invertebrate diversity, and numbers in a fashion similar to that used for Figures 5-1 through 5-6 would aid in interpretation of the community trends and add consistency to the report. Is any of this information available?

Response: Issues addressed by medium and low priority comments are noted. The report will be revised to clarify text or provide additional supporting information as requested by the comments.

Low Priority:

1. Page 3, Section 2.1, First Paragraph: If available, annual graphs of Soda Creek flow (CFS x day or week) would more clearly summarize the flow than just presenting the average annual flows. Several years could be placed on the same graph using different style lines.

2. Page 8, Section 4.2, Fifth Full Paragraph on Page: Surface water analyses should have included vanadium and molybdenum.

3. Page 10, Section 4.5.1, First Paragraph: The distribution of the samples (e.g. normal or non-normal) should be discussed.

4. Page 13, Section 5.1, First Paragraph, last sentence: Provide the mean sediment pH of the reference reservoir samples and the test reservoir samples in the text. Presentation in parentheses next to each respective text reference would suffice. This will help highlight the difference. Also, since the physical characteristics of the sediments may affect the interpretation of comparisons, the characteristics should be compared between the reference and test sediments rather than the creek and reservoir as was done here. This is particularly true because no statistical comparisons are made between the reservoir and the creek.

5. Page 15, Section 5.1, First Full Paragraph on the Page, Fifth Sentence: The portion of the sentence regarding the "decrease in significance level...," should be removed. Technically, no conclusions can be inferred from the decrease in significance level with distance from the creek mouth Each of the differences are statistically significant at the chosen level of alpha (0.05). The next sentence of the paragraph correctly uses the data to infer that the concentrations are decreasing with distance from the creek mouth.

Response: Issues addressed by medium and low priority comments are noted. The report will be revised to clarify text or provide additional supporting information as requested by the comments.

ATTACHMENT B

BRIEF COMPARISON OF THE SODA CREEK SEDIMENT INVESTIGATION WITH THE EMF SEDIMENT INVESTIGATION

The following is a discussion/comparison of the Soda Creek sediment investigation with the EMF sediment investigation. The evaluation criteria for the EMF sediment investigation included the following:

- Comparison of site contaminant concentrations to background;
- Evaluation of results of simultaneously extractable metals and acid volatile sulfides (SEM/AVS) analyses;
- Comparison of site contaminant concentrations to published or available ecological concern levels;
- Consideration of additional relevant factors, such as the tendency of some site contaminants to biomagnify in aquatic food chains, or information from previous studies indicative of site-related contamination; and
- An approach for integrating this information into a weight-of-evidence judgment of the significance of results.

The format of the EMF document mirrors recommendations provided in EPA ecological risk assessment guidance. The Soda Creek sediment evaluation is formatted in a more journalistic reporting structure. This does not necessarily affect the assessment of risks in either document. The general approach for estimating ecological effects is similar between the two documents. Sediment and surface water samples were collected in both investigations from stream and delta/reservoir areas. Both investigations statistically and graphically compared contaminant concentrations to background/reference concentrations, but the EMF study incorporated the use of sediment effects benchmarks (ecological concern levels) in a risk-based screening while the Soda Creek study did not. The Soda Creek investigation used a triad approach to assessing ecological effects and therefore, involved more sampling and analysis of the benthic communities. Other relevant factors and weight of evidence are considered in both investigations, although the Soda Creek investigation did not specifically address the biomagnification potential of contaminants. Both investigations also used toxicity testing to aid in effects determinations, but the Soda Creek study involved a more detailed toxicity testing regime.

Overall, the Soda Creek investigation involved a more exhaustive approach than employed at EMF, and should provide more reliable information regarding the potential for ecological effects to benthic and aquatic species More detailed reporting and risk-based screening would benefit the Soda Creek sediment evaluation. Other than the benthic community assessment and the number of toxicity bioassays, the general approaches were similar between the two studies.

In the current investigations, the only similar metals analyzed at both the Soda Creek and the EMF sites were arsenic, cadmium and selenium. Arsenic concentrations were approximately ten times greater at Soda Creek than at the Portneuf River but background concentrations were similar between the two sites. Cadmium concentrations were approximately 20 times greater at Soda Creek, and background concentrations were similar between the two sites. Selenium concentrations were approximately 20 times greater at Soda Creek than at the Portneuf and background concentrations at Soda Creek were approximately 4 times higher. These three contaminants are potentially of concern at Soda Creek.

Sediment concentrations in Alexander Reservoir, at the mouth of Soda Creek, of arsenic, cadmium and selenium were all elevated above Portneuf River concentrations, while concentrations from the Snake River reference area were similar to those found in the Alexander Reservoir reference area. Selenium and arsenic sediment concentrations near the mouth of Soda Creek were less than 10 times greater than in Portneuf River sediments, but cadmium was up to 30 times greater.

Cadmium concentrations in the Soda Creek investigation were elevated above concentrations in the Portneuf River and cadmium is also the only contaminant at Soda Creek that does not drop below the reference concentration upper tolerance limit (UTL), so it would appear to be the contaminant of highest concern.

Given these results (higher metals concentrations at Soda Creek) it is possible that the Soda Creek investigation could, but won't necessarily, predict risks, even though the EMF did not. Based upon this comparison, it may be appropriate to correlate invertebrate diversity and numbers, to cadmium in the Soda Creek investigation.